Economics 579

Advanced Topics in Applied Econometrics

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Spring 2021

MW 2:45-4:05

Course Objectives and Scope

Econometrics is an essential tool in economics research. Whether or not the student is working in economic theory or is conducting applied empirical research an understanding of the current issues in econometrics is needed in order to frame and motivate theoretical work or in carrying out empirical research using the most up to date methods and techniques. Economics 579, Advanced Topics in Applied Econometrics, is meant to expose PhD students in Economics to treatments in the literature that may not have been covered in depth or not covered at all in the standard Economics 510/511 sequence. The topics covered this semester are detailed in the course outline below.

Learning Outcomes

- Develop the ability to use advance topics in econometrics and to evaluate their strengths and potential weaknesses.
- Develop an understanding and intuition of how such advanced methods extend the methods and techniques already presented in Economics 510/511 and also address certain shortcoming in those methods and techniques.
- Learn how to use such these advanced topics to better understand current research presented in the departmental seminars.
- Critique current research in econometrics discussed in the course lectures.
- Develop a research paper that addresses one of the topics we cover in the course and present findings in class.

Grading: Students will be expected to present a research paper at the end of the semester. During the semester students will provide written reports (~ 2 pages) on selected readings and complete computer assignments on selected topics. We also will review some of the papers that are to be presented in the Rice Economics Department's Econometrics and Applied Micro Workshops. Lectures by Sickles will be supplemented with occasional guest lecturers.

Prerequisite: Economics 511 or equivalent or by permission of the instructor

Recommended Textbooks for Panel Data Econometrics and Microeconometrics

Wooldridge, J. 2010. *Econometric Analysis of Cross Section and Panel Data* (2nd. Edition), Cambridge: MIT Press.

Cameron, C., and Trivedi, P. (2009) *Microeconometrics: Methods and Applications* (8th Edition), New York: Cambridge University Press.

Hayashi, F. (2000) *Econometrics*, Princeton: Princeton University Press.

Greene, W. (2011) *Econometric Analysis,* (7th Edition) New Jersey: Prentice Hall.

Oxford Handbook of Panel Data (2015) Badi Baltagi (Editor), New York: Oxford University Press.

Qi, L., and Racine, J. S. (2006) *Nonparametric Econometrics: Theory and Practice*, New York: Princeton University Press.

Sickles, R., and V. Zelenyuk (2019) *Measurement of Productivity and Efficiency: Theory and Applications*, New York: Cambridge University Press.

Oxford Handbook of Productivity Analysis (2018) Emili Griffel-Tatje, C. A. K. Lovell, and Robin C. Sickles (Editors), New York: Oxford University Press.

Course Outline

1. Extended panel data methods
    - Primer on static panel data models
    - A Primer on dynamic panel data models
    - Panel data models for discrete choice, unbalanced panels, and nonlinear panels (Part I, Part II, Part III, Part IV)
    - Related Papers
2. Spatial Econometrics
    - Lecture 1
        - Supplementary Materials
    - Lecture 2
    - Lecture 3-Weighting Matrices
        - Digression on Row and Column Normalizations
    - Lecture 4-Spillovers in SFA Models
        - Supplementary Materials
    - Lecture 5-Nonlinear Spatial Models
    - Related Papers
    - Lecture 6

3. Bootstrapping
    - Lecture on Bootstrap
    - Wild Bootstrap
    - The Goods, the Bads, and the Ugly
    - Notes on HCCM
    - Parametric and non-parametric bootstrap simulations
    - Related Papers
4. Factor Models, Wavelets, Smoothing-Splines, Sieves
    - Lecture Notes
    - Wavelets Lecture
    - Sieve Lecture
    - Bernstein Polynomials and Semi-Nonparametric Estimators and Shape Restrictions Lecture
    - Shape Restrictions in Parametric and Semi-nonparametric Methods via Integral Transformations
        - LectureNotes
        - Related Papers
    - Related Papers
    - Neural Networks and Machine Learning
        - Lecture Notes
        - Related papers
    - Software
        - The code for the KSS and for the determination of the number of factors using the Bai and the Kneip et al. approaches can be found at:
            - http://www.academia.edu/5068711/The_R-package_phtt_Panel_Data_Analysis_with_Heterogeneous_Time_Trends (Links to an external site.)Links to an external site.
            - https://cran.r-project.org/web/packages/phtt/index.html (Links to an external site.)Links to an external site.
5. Model averaging as a Sieve Estimator
    - Lecture Notes
    - Related Papers
    - http://www.ssc.wisc.edu/~bhansen/progs/progs_ma.html (Links to an external site.)Links to an external site.
    - http://www.ssc.wisc.edu/~bhansen/progs/HandbookNonparametrics.html (Links to an external site.)Links to an external site.
6. Bayesian Econometrics/ Metropolis-Hastings MCMC Algorithms
    - An Overview of Bayesian Econometrics
    - Stata notes on MCMC and M-H algorithms with Animations
    - Related Papers
7. Continuous and Discrete Dynamic Programming Models
    - Lecture Notes
    - Related Papers
    - Kalman Filter

        - Lecture Notes
        - Related Papers

Additional Lecture Topics Covered in Previous Topics Courses

1. Econometrics of Auctions
    - Lecture Notes
    - Related Papers
    - Auctions Software
2. BLP Method of Demand Curve Estimation in Industrial Organization
    - Lecture Notes
    - Related Papers
3. Structural and Non-structural models of producer behavior/endogeneity issues
    - Introduction to Non-Structural Models of Productivity
    - Lecture on Parametric and Semi-Parametric Stochastic Frontier Models
    - Lecture on Treatments for Heterogeneity
    - Lecture on Olley and Pakes (1996)
    - Lecture on Endogeneity in Non-Structural Models of Productivity
    - Related Papers
4. Point and Set Identification
    - Lecture on Point and Set Identification
    - Lecture on Partial Identification
    - Lecture on Partial ID for Simultaneous Qualitative Response and Bounded Efficiency Models
        - Set Identification in the Bounded Efficiency Model
        - Qualitative and Limited Dependent Variables-Issues with Point and Set Identification
    - Related Papers
5. Nonparametric Estimation

Student Presentations

Software Programs for Spatial Econometrics Modeling

The following software programs are widely used to implement spatial econometrics models:

1. GeoDa: https://geodacenter.asu.edu/ (Links to an external site.)Links to an external site.
2. Spdep package in R: http://cran.r-project.org/web/packages/spdep/spdep.pdf (Links to an external site.)Links to an external site.

3. Econometrics Toolbox in Matlab: http://www.spatial-econometrics.com/ (Links to an external site.)Links to an external site.
4. NC State Statistics Department package in R: https://rdinterspatial.wordpress.ncsu.edu/ (Links to an external site.)Links to an external site.
5. Implementing procedures for spatial panel econometrics in Stata: https://www.stata.com/meeting/uk11/abstracts/UK11_hughes.pdf

The user's manuals of these software programs can be found on these websites.

Software Programs for Panel Data Modeling

1. Computer Programs and Data to Accompany

Measurement of Productivity and Efficiency: Theory and Practice by Robin C. Sickles and Valentin Zelenyuk Under contract with Cambridge University Press

https://sites.google.com/site/productivityefficiency/

2. phtt: Panel Data Analysis with Heterogeneous Time Trends

Installation details

Texas Econometrics Camp-XXV

- Conference link
- Conference program

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